FLYING TEA ROCKEt

###### http://www.stevespanglerscience.com/media/ee/155f823520d67cabe4fe8f19dbd08109f9b7c79a.jpg**MATERIALS**

* Tea bag
* Dinner Plate
* Matches or lighter
* Scissors

###### **EXPERIMENT**

1. Remove the staple, string, and label from the bag of tea.
2. If your bag of tea is not open on its ends, cut both ends off and empty out the tea into the trash.
3. Unfold the bag of tea so that it is completely straight.
4. Use your fingers to open up the bag of tea. You should end up with a shape resembling a cylinder.
5. Stand the cylinder on one end on a flat, nonflammable surface. A dinner plate works perfectly.
6. Using a lighter or match, ignite the top of the cylinder.
7. Watch the flame travel down from the top of the cylinder until...
8. Liftoff! The bag of tea takes off into the air like a rocket.

###### **HOW DOES IT WORK?**

There are three principles acting on the cylinder you've made from the bag of tea that make this experiment work.

The first principle involves the density of the air within the cylinder as it compares to the air on the outside of the cylinder. As the flame burns down the bag of tea, it heats the air that is contained within the cylinder. The heat excites individual air molecules and causes them to move more quickly and spread out within the cylinder. The excited air molecules inside the cylinder are farther apart than those on the outside of the cylinder, making the air inside the cylinder less dense than the air outside the cylinder. This warmer, less dense air rises above the cooler, more dense air.

This experiment also demonstrates the principle of convection currents. As we just explained, the burning bag of tea creates hot, less dense air. This creates a thermal, or convection, current. The space created by the less dense air inside the cylinder allows the dense air outside to push upwards from the bottom. That movement or current of air is referred to as *a convection current*.

But that isn't enough to create the rocket that you saw at the end of the experiment. As the bag of tea burns, it turns into both ash and smoke. The smoke lifts away and dissipates into the air, leaving just a delicate ash frame. Since the ash is so lightweight, the force of the rising hot air is strong enough to lift the ash into the air.

###### **ADDITIONAL INFO**

There is also a real world connection with this experiment. While vehicles like NASA rockets or harrier jets (these are really amazing, look them up) use propulsion to achieve a vertical "liftoff," hot air balloons use a similar method to your rocket that you created with a bag of tea. Hot air balloons use a burner to heat the inside of the balloon, creating the same air density change that you made with your rocket. However, there is no mass change like when your paper turned to ash. Instead, the air inside the balloon is heated much hotter than the air outside, creating an envelope of air much less dense than the air outside. As a result, the balloon lifts off the ground.